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PATENT
Docket No. 393032041500

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Patent Application of: Masatsugu OKAZAKI	Confirmation No.: 7106
Application No.: 10/676,205	Examiner: Jianchun Qin
Filed: September 30, 2003	Art Unit: 2837
For: COMPRESSED DATA STRUCTURE AND APPARATUS AND METHOD RELATED THERETO	Notice of Allowance Mailed: November 21, 2007

STATEMENT REQUESTING DELETION OF NAMES OF INVENTORS PURSUANT TO 37 C.F.R. § 1.63(d)(2) AND 37 C.F.R. § 1.33(b)

MS Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Pursuant to 37 CFR § 1.63(d)(2), 37 CFR 1.33(b) and 37 CFR 1.48(b), and in view of the cancellation of Claims 12-32 (see attached amendment), Applicants request that Tokio SHIRAKAWA be deleted as an inventor in the above-identified application. With the deletion of the above-mentioned inventor, Masatsugu OKAZAKI is the sole inventor named in the present application.

The Director is hereby authorized to charge the processing fee as set forth in 37 CFR § 1.17(i), and any other fees under 37 C.F.R. §§ 1.16 and 1.17 that may be required by this paper, or to credit any overpayment, to **Deposit Account No. 03-1952**.

Respectfully submitted,

Dated: February 12, 2008

By: _____

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I hereby certify that this correspondence is being deposited with the U.S. Postal Service as First Class Mail with sufficient postage in an envelope addressed to: MS Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Dated: October 24, 2007 Signature: (Hristo Vachovsky)

Docket No.: 393032041500
Client reference: H8022US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Masatsugu OKAZAKI et al.

Confirmation No.: 7106

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For: COMPRESSED DATA STRUCTURE AND APPARATUS AND METHOD RELATED THERETO

RESPONSE TO NON-FINAL OFFICE ACTION

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

INTRODUCTORY COMMENTS

In response to the Office Action dated April 24, 2007, for which a response was due on July 24, 2007, and for which a three-month extension of time extending the time for response from July 24, 2007 to October 24, 2007 is also submitted, please consider the following:

There are no amendments to the specification, drawings or claims listed beginning on page 2.

Remarks begin on page 10.

LISTING OF THE CLAIMS

Claim 1 (previously presented): A tone generation apparatus comprising:

a memory capable of storing n bits data per address, said memory storing a plurality of compressed waveform data segmented into a plurality of frames,

wherein a number of bits per sample of the compressed waveform data is variable between the frames, but uniform within each of the frames,

each of the frames of the compressed waveform data is stored over a predetermined number j of successive addresses of said memory, and

each of the frames includes, in a predetermined layout, an auxiliary information area for storing auxiliary information that includes compression-related information to be used for decompressing the compressed waveform data, and a data area for storing a plurality of samples of the compressed waveform data of the frame, wherein irrespective of the number of bits per sample of compressed waveform data stored in said data area of each frame, each frame is stored over said predetermined number j of successive addresses, wherein said auxiliary information area and data area in each frame are fixed in position irrespective of the number of bits per sample of compressed waveform data stored in the frame, and wherein said compression-related information includes number-of-bits information indicative of said number of bits per sample within the corresponding one of the frames;

an address generation section that generates, every sampling cycle, a readout address varying at a predetermined rate corresponding to a designated tone pitch;

a readout section that designates, on the basis of said readout address, any one of the frames to be read out and reads out stored data of the designated frame from said memory address by address;

an auxiliary information retrieval section that, of the data of the frame read out by said readout section, retrieves the auxiliary information from the auxiliary information area;

a compressed waveform data retrieval section that, of the data of the frame read out by said readout section, retrieves the samples of the compressed waveform data from the data area in accordance with the number of bits per sample designated by said number-of-bits information included in the auxiliary information retrieved by said auxiliary information retrieval section;

a decoding section that decompresses each of the samples of the compressed waveform data retrieved by said compressed waveform data retrieval section; and

a tone generation section that generates a tone on the basis of the waveform data decompressed by said decoding section.

Claim 2 (previously presented): A tone generation apparatus as claimed in claim 1 wherein said data area ranges over a plurality of addresses in the j successive addresses irrespective of the number of bits per sample of the compressed waveform data stored in the data area of each frame, and the data area region in each of said plurality of addresses compactly stores a plurality of samples of the compressed waveform data.

Claims 3-5 (canceled)

Claim 6 (previously presented): A waveform storage processing apparatus comprising:

a compression processing section that compresses a plurality of samples of waveform data;

a framing section that segments the plurality of samples of waveform data, compressed by said compression processing section, into a plurality of frames to thereby form the frames, wherein each of the frames has a fixed total number of bits and includes a fixed auxiliary information area and a remaining data area, by packing the compressed and segmented waveform data into the data area and packing compression-related information into the auxiliary information area, wherein a number of bits per sample of the packed waveform data is uniform within each of the frames but variable between the frames, wherein irrespective of the number of bits per sample of compressed waveform data stored in said data area of each frame, each frame is stored over said predetermined number j of successive addresses, and said compression-related information includes number-of-bits information indicative of said number of bits per sample within the corresponding one of the frames and decompression parameters to be used for the decompression of said compressed waveform data in the corresponding one of the frames; and

a writing section that, for each of the frames, writes the frame, formed by said framing section, into memory capable of storing n bits per address, over a predetermined number j of successive addresses.

Claim 7 (previously presented): A tone generation apparatus as claimed in claim 1, wherein m bits of the n bits (where $m < n$) in the j addresses of said memory contain said data area, and a remaining "n-m" bits of the n bits in the j addresses of said memory contain said auxiliary information area.

Claim 8 (previously presented): A tone generation apparatus as claimed in claim 7 wherein m is k times a number of bits i per sample of the compressed waveform data of the frame, where k is an integral number equal to or greater than one.

Claim 9 (previously presented): A memory storing a plurality of frames of compressed waveform, said memory being capable of storing n bits data per address, said memory storing a plurality of compressed waveform data segmented into a plurality of frames,

wherein a number of bits per sample of the compressed waveform data is variable between the frames, but uniform within each of the frames,

each of the frames of the compressed waveform data is stored over a predetermined number j of successive addresses of said memory,

each of the frames includes, in a predetermined layout, an auxiliary information area for storing auxiliary information that includes compression-related information to be used for decompressing the compressed waveform data, and a data area for storing a plurality of samples of the compressed waveform data of the frame, wherein irrespective of the number of bits per sample of compressed waveform data stored in said data area of each frame, each frame is stored over said predetermined number j of successive addresses, wherein said auxiliary information area and data area in each frame are fixed in position irrespective of the number of bits per sample of compressed waveform data stored in the frame, and wherein said compression-related information includes

number-of-bits information indicative of said number of bits per sample within the corresponding one of the frames, and

wherein m bits of the n bits (where m < n) in the j addresses of said memory contain said data area, and remaining "n - m" bits of the n bits in the j addresses of said memory contain said auxiliary information area.

Claim 10 (previously presented): A tone generation apparatus comprising:

a memory capable of storing n bits data per address, said memory storing a plurality of compressed waveform data segmented into a plurality of frames,

wherein a number of bits per sample of the compressed waveform data is variable between the frames, but uniform within each of the frames,

each of the frames of the compressed waveform data is stored over a predetermined number j of successive addresses of said memory, and

each of the frames includes, in a predetermined layout, an auxiliary information area for storing auxiliary information that includes compression-related information to be used for decompressing the compressed waveform data, and a data area for storing a plurality of samples of the compressed waveform data of the frame, wherein irrespective of the number of bits per sample of compressed waveform data stored in said data area of each frame, each frame is stored over said predetermined number j of successive addresses, wherein said auxiliary information area and data area in each frame are fixed in position irrespective of the number of bits per sample of compressed waveform data stored in the frame, and wherein said compression-related information includes number-of-bits information indicative of said number of bits per sample within the corresponding one of the frames;

an address generation section that generates, every sampling cycle, a readout address varying at a predetermined rate corresponding to a designated tone pitch;

a readout section that designates, on the basis of said readout address, any one of the frames to be read out and reads out stored data of the designated frame from said memory address by address;

an auxiliary information retrieval section that, of the data of the frame read out by said readout section, retrieves the auxiliary information from the auxiliary information area;

a compressed waveform data retrieval section that, of the data of the frame read out by said readout section, retrieves the samples of the compressed waveform data from the data area in accordance with the number of bits per sample designated by said number-of-bits information included in the auxiliary information retrieved by said auxiliary information retrieval section;

a decoding section that decompresses each of the samples of the compressed waveform data retrieved by said compressed waveform data retrieval section; and

a tone generation section that generates a tone on the basis of the waveform data decompressed by said decoding section,

wherein m bits of the n bits (where $m < n$) in the j addresses of said memory contain said data area, and a remaining "n – m" bits of the n bits in the j addresses of said memory contain said auxiliary information area, and

wherein said auxiliary information retrieval section retrieves the auxiliary information by taking out the data of "n-m" bits from the data of the n bits, successively read out by said read out section, and

wherein said compressed waveform data retrieval section further comprises a temporary storage section that stores the data of the m bits among the data of n bits, successively read out by said read out section, and said compressed waveform data retrieval section retrieves the samples by taking out each of the samples of compressed waveform data from the data of the m bits stored in said temporary storage section, in accordance with the readout address generated by said address generation section and the number of bits per sample designated by said number-of-bits information.

Claim 11 (previously presented): A tone generation apparatus as claimed in claim 10 wherein said temporary storage section is capable of storing one or a plurality of, less than j, the data of the m bits.

Claims 12-32 (canceled)

Claim 33 (previously presented): A tone generation apparatus as claimed in claim 1, wherein said compression-related information further includes decompression parameters to be used for the decompression of said compressed waveform in the corresponding one of the frames.

Claim 34 (previously presented): A tone generation apparatus as claimed in claim 1, wherein said auxiliary information further includes loop addresses to be used for generation of a tone.

Claim 35 (previously presented): A tone generation apparatus as claimed in claim 1, wherein said compression-related information further includes decompression parameters to be used for the decompression of said compressed waveform in the corresponding one of the frames, and said decoding section decompresses each of the samples of the compressed waveform data, using the decompression parameters included in the auxiliary information retrieved by said auxiliary information retrieval section.

Claim 36 (previously presented): A tone generation apparatus as claimed in claim 35, wherein said decompression parameters are parameters created on the basis of compression parameters used in compressing original waveform data to create said compressed waveform data.

Claim 37 (previously presented): A tone generation apparatus as claimed in claim 35, wherein said decompression parameters are loop addresses for repetitively reading out said compressed waveform data.

Claim 38 (previously presented): A tone generation apparatus as claimed in claim 10, wherein said number-of-bits information in the auxiliary information included in one of the frames indicates said number of bits per sample within the next frame.

Claim 39 (previously presented): A tone generation apparatus as claimed in claim 10, wherein said number-of-bits information in the auxiliary information included in one of the frames indicates said number of bits per sample within the one frame.

Claim 40 (previously presented): A tone generation apparatus as claimed in claim 10, wherein said compression-related information further includes decompression parameters to be used for the decompression of said compressed waveform in the corresponding one of the frames, and said decoding section decompresses each of the samples of the compressed waveform data, using the decompression parameters included in the auxiliary information retrieved by said auxiliary information retrieval section.

Claim 41 (previously presented): A tone generation apparatus as claimed in claim 40, wherein the decompression parameters in the auxiliary information included in one of the frames are used for the decompression of at least one sample of the waveform data included in the next frame.

Clam 42 (previously presented): A tone generation apparatus as claimed in claim 40, wherein the decompression parameters in the auxiliary information included in one of the frames are used for the decompression of at least one sample of the waveform data included in the next frame.

Claim 43 (previously presented): A tone generation apparatus as claimed in claim 10, wherein said auxiliary information retrieval section gathers the "n-m" bits of the n bits read out by said readout section during each of the frames and, after completion of the gathering of each of the frames, outputs the thus-gathered auxiliary information.

Claim 44 (previously presented): A tone generation apparatus as claimed in claim 40, wherein said auxiliary information retrieval section gathers the "n-m" bits of the n bits read out by said readout section during a predetermined range in each of the frames and, after completion of the gathering of the range, outputs the thus-gathered decompression parameters.

Claims 45-46 (canceled)

REMARKS

The present amendment is submitted in response to the Office Action entered on April 24, 2007. Claims 1, 2, 6-11 and 33-44 are pending. Applicant notes with appreciation the indication of allowable subject matter with respect to claim 8 and the allowance of claims 10, 11 and 38-44.

Claims 1, 2, 7, and 33-37 were rejected under 35 U.S.C. §103(a) as being obvious in view of Suzuki I (U.S. Pat. No. 5,489,746) in combination with Suzuki II (U.S. Pat. No. 5,831,193) and McDowell (U.S. Pat. No. 6,931,370). Claims 6 and 9 were rejected as obvious in view of Suzuki I in combination with McDowell.

Independent claims 1, 6, 9 and 10 recite (i) "wherein a number of bits per sample is variable between the frames", (ii) "but [the number of bits per sample] is uniform within each of the frames", (iii) and that each frame is of the same size (more specifically, claims 1, 9 and 10 recite "each of the frames of the compressed waveform data is stored over a predetermined number j of successive addresses" and claim 6 recites "wherein each of the frames has a fixed total number of bits").

The features of Suzuki II the Examiner relied on are actually disclosed in Suzuki I. Therefore, Applicant's arguments center on the combination of Suzuki I and McDowell.

Suzuki I discloses an audio encoding mechanism which stores waveform data. According to Suzuki I, the number of bits per sample is variable for different frames. However, Suzuki I does not disclose that the frames are of the same size, as required by the claims. On the contrary, Suzuki I discloses frames of different sizes. Specifically, Suzuki I discloses frames that have the same number of samples but different number of bits per sample. Therefore, the frames have different sizes overall. For example, Fig. 2 shows three frames of different sizes wherein each frame includes 16 samples but the number of bits per sample of the different frames are different (i.e., 11 for Frame 0, 10 for Frame 1 and 12 for Frame 2).

The Examiner has sought to make up Suzuki I's deficiencies by citing McDowell. McDowell is completely inapplicable with Suzuki I. Applicant respectfully submits that the Examiner has failed to appreciate McDowell's inapplicability as discussed in the previous response. Applicant believes it is important to describe what McDowell discloses.

McDowell discloses encoding audio data according to a sub-band coding technique. A "sub-band" refers to a specific frequency (or a relatively narrow range of frequencies). An ordinary audio signal is usually represented by a waveform. The system of McDowell splits that waveform into multiple components each component being associated with a specific frequency (or sub-band). Thus, McDowell maps the original waveform data into multiple sets of sub-band data each set being associated with a respective sub-band.

The individual sub-band data is smaller in number of samples than the original waveform data. More specifically, each sub-band has an associated number of bits. The data associated with each sub-band is re-quantized in such a manner as to be limited to the number of bits associated with that sub-band. Some sub-bands have no bits associated with them, so data from these sub-bands is discarded. Data associated with all sub-bands that have bits allocated to them for a specific period of time is stored into a frame. Multiple frames are generated to define an audio signal of a longer period of time.

Thus, in general, McDowell discloses a system where a single waveform is split into multiple sub-bands of different frequencies and data defining the different sub-bands is stored separately, i.e., the waveform data is decomposed in the frequency domain. This is different from a system where an original waveform data is compressed sample by sample, i.e., in the time domain, as in Suzuki I.

McDowell discloses that each frame comprises fixed length codes (FLCs) (see, e.g., col. 3, line 34). This is achieved by fixing the bit allocation between frames (see, e.g., col. 3, lines 38-41; col. 7, lines 24-27; col. 8, lines 30-33, col. 10, lines 9-18). Thus, McDowell discloses that for a specific sub-band, the number of bits per sample for different frames is fixed.

Furthermore, McDowell discloses that the number of bits per sample is different for different sub-bands within a single frame as is usually the case for sub-band coding (see, e.g., col. 8, lines 15-18; col. 10, lines 15-18). Thus, for a single frame, the number of bits per sample differs for the different sub-bands within that frame.

The Examiner may maintain that the number of bits per sample within a frame is fixed if a frame of only one sub-band is considered. However, in that case, if the number of bits per sample of different frames varies (as recited by the claims), then the size of the frames will also vary, as McDowell requires that the number of samples of each sub-band be fixed. However, the claims recite frames of uniform size. Therefore, it is apparent that McDowell fails to disclose various elements of the claims.

With the above discussion, it is clear that Suzuki I cannot be combined with McDowell as the Examiner seeks to do. Suzuki I discloses compressing waveform data in the time domain, while McDowell discloses doing so in the frequency (or sub-band) domain. Thus, the actual data stored by the Suzuki I and McDowell are entirely different. More specifically, while Suzuki I stores samples defining the actual audio waveform being encoded, McDowell stores data defining a plurality of different waves of different frequency bands.

Furthermore, combining these two references is not even possible without undue experimentation. Because time domain and frequency domain encodings comprise entirely different data, directly combining time domain and frequency domain storage data formats would not be possible without completely corrupting the data. Thus, in order to apply a frequency domain storage format to time domain data one would need to convert the time domain data into the frequency domain and save the data in the frequency domain. However, such a data conversion is not contemplated by the present invention.

In the "Response to Arguments" section of the Office Action, the Examiner states that "the combination of Suzuki I with McDowell's teaching of storing in memory compressed data that is packed in a plurality of data frames of equal size reads on the claims." See Examiner's Action,

page 11. Applicant urges the Examiner to show exactly how the teachings of McDowell can be added to Suzuki I to make the frames of Suzuki I be of equal size while ensuring that different frames feature different bits per samples. As noted above, Suzuki I illustrates its format in Figure 2. There, three frames are shown. Frame 0 includes 16 samples, each having 11 bits per sample (for an overall compressed data size of 176 bits), frame 1 includes 16 samples of 10 bits each (for an overall size of 160 bits) and frame 2 includes 16 samples of 12 bits each (for an overall size of 192 bits).[1] Applicant respectfully requests the Examiner to show how these frames can be modified in accordance with the teachings of McDowell in order to make all frames have the same size. Applicant respectfully contends that McDowell teaches no such modification.

In contrast, the present invention provides that each frame is of the same size, although the number of bits per sample differs for each frame (see, e.g., Figs 8-11). Each frame stores compressed waveform data in the form of time domain samples. Thus, if the samples are read from the frame with read addresses varying at a first designated frequency, an audio tone corresponding to that frequency can be generated.

Consequently, Applicant respectfully contends that the argument that McDowell and Suzuki I teach the combination of elements (i), (ii) and (iii) above is not based on the actual teachings of these references. The actual teachings of the references do not show how these references can be combined in a single working system.

The Examiner correctly stated that "one cannot show non-obviousness by attacking references individually where the rejections are based on combinations of references." However, Applicant's arguments do not rest on individual attacks of references, but of the assertion that the teachings of the references cannot be combined to form a single system that corresponds to the present claims. For example, the teachings cannot be combined to produce a system that provides for multiple frames including samples of different bit lengths for different frames while keeping the frames of the same size.

[1] Bits HB0-HB3 are not considered as they do not include compressed waveform data. However, even if these bits were

It is respectfully asserted that independent claims 1, 6, 9 and 10 are patentable in view of the cited art for the reasons discussed above. Dependent claims 2, 7, 8 and 33-37 are patentable because they depend from claims 1, 6, 9 and 10.

Applicant respectfully submits that, for the above discussed reasons, all pending claims are in condition for allowance.

If, for any reason, the Examiner finds the application other than in condition for allowance, Applicant requests that the Examiner contact the undersigned attorney at the Los Angeles telephone number (213) 892-5790 to discuss any steps necessary to place the application in condition for allowance.

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considered, the various frames would still be of different sizes.

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In the unlikely event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, Applicant's petition for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing Docket No. 393032041500.

Dated: October 24, 2007

Respectfully submitted,

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